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Zelotetraploa aquatica gen. & sp. nov. and *Blastoheterospora catenata* gen. & sp. nov., on submerged wood from Brazil

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Abstract—Two new genera and species, *Zelotetraploa aquatica* and *Blastoheterospora catenata*, are described and illustrated. *Zelotetraploa aquatica* is distinguished by monoblastic, globose conidiogenous cells and rectangular to oblong, euseptate, dictyoseptate conidia composed of four rows of cells that develop independently. *Blastoheterospora catenata*, which arises conspicuously from the conidial cell rows of *Z. aquatica*, is characterized by branched blastocatenate conidia that are polymorphic (unicellular, phragmoseptate, dictyoseptate, or subchiroid) and variegated, with a *Conioscyphopsis*-like synanamorph arising rarely from dictyoseptate conidia.

Key words—freshwater, asexual fungi, hyphomycetes, taxonomy

Introduction

The diversity of conidial fungi in the Brazilian semiarid region has received little attention. Taking into account its very variable physical conditions, this region is considered a stressed reservoir of biodiversity. However, its mycobiota, especially saprobic dematiaceous hyphomycetes, is very diverse as has been recently revealed by the discovery of numerous new genera and species (Almeida et al. 2015, Cantillo-Pérez et al. 2015, Fiuza et al. 2014, Gusmão et

al. 2008, Leão-Ferreira et al. 2008, 2013, Santa Izabel et al. 2015, Silva et al. 2015). During a mycological study of fungi associated with immersed vegetal materials in this region, two interesting fungi were collected from submerged wood in a river. These showed remarkable differences from all previously described genera of hyphomycetes (Seifert et al. 2011). Each fungus is therefore described here as a new genus and species.

Material & methods

Samples of plant material submerged in a river were placed in plastic bags for transport to the laboratory where they were gently washed, placed in Petri dish moist chambers, and incubated in a 170 L polystyrene box with 200 mL sterile water plus 2 mL glycerol, at 25°C for 30 days (Castañeda-Ruiz et al. 2016). Mounts were prepared in PVL (polyvinyl alcohol and lactic acid). Measurements were made at a magnification of ×1000. Micrographs were obtained with an Olympus BX51 microscope equipped with bright field and Nomarski interference optics. The type specimens are deposited in the Herbarium of Universidade Estadual de Feira de Santana, Bahia, Brazil (HUEFS).

Taxonomy

Zelotetraploa J.S. Monteiro, Gusmão & R.F. Castañeda, **gen. nov.**

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Differs from *Tetraploa* by its hyaline or subhyaline hyphae and its globose to ellipsoidal, brown conidiogenous cells.

Type species: *Zelotetraploa aquatica* J.S. Monteiro et al.

Etymology: Greek, *zelo-,* meaning emulation, + Latin, *-tetraploa*, referring to the genus *Tetraploa.*

Colonies on the natural substrate effuse, brown. Conidiophores micronematous mostly reduced to conidiogenous cell. Conidiogenous cells monoblastic, intercalary, determinate, ellipsoidal, globose, brown. Conidial secession schizolytic. Conidia solitary, rectangular to oblong, euseptate, composed of four parallel, tightly packed rows of cells, brown to dark brown, smooth.

Zelotetraploa aquatica J.S. Monteiro, Gusmão & R.F. Castañeda, **sp. nov.** Figs 1–4

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Differs from *Paratetraploa exappendiculata* by its hyaline or subhyaline hyphae, globose to ellipsoidal conidiogenous cells, and its smooth conidia.

Type: Brazil, Bahia: Piatã, Rio Patricio, 13°09′S 41°46′W, on submerged decaying wood in a river, 10 January 2016, coll: M.C.O. Amorim (**Holotype**, HUEFS 216680).

Etymology: Latin, *aquatica,* referring to the aquatic environment where the species grows.

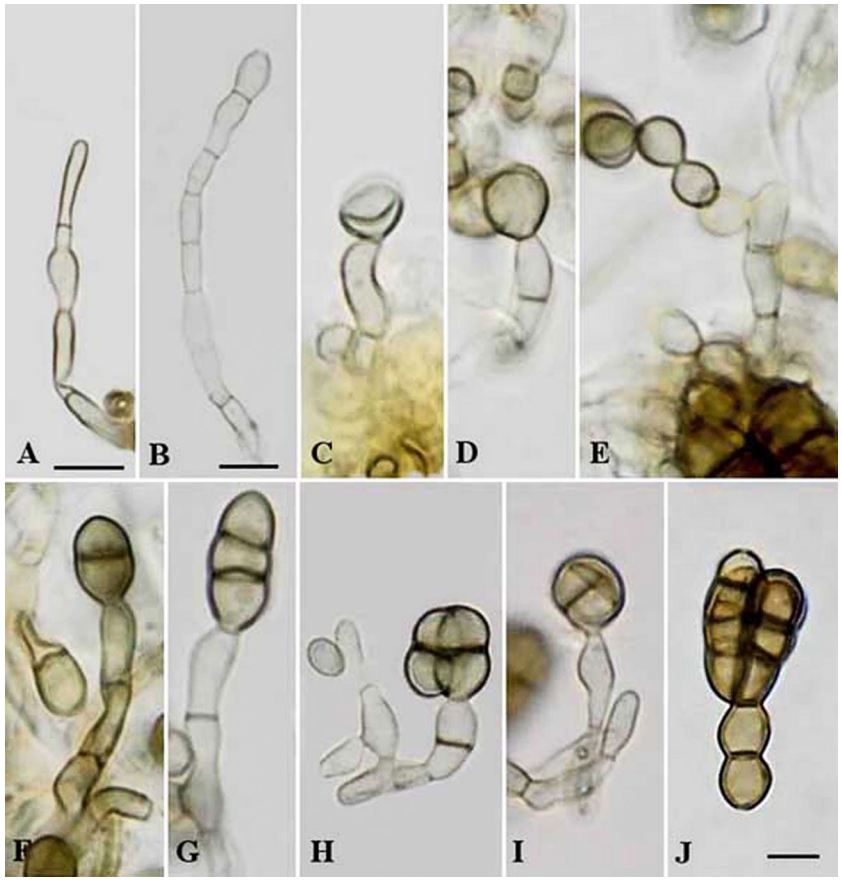

Fig. 1. ***Blastoheterospora catenata*** (holotype, HUEFS 216679): A, B. Conidiophores and conidiogenous cells. C. Conidiogenous cell and collapsed conidium. D–I. Conidiogenous cells and conidia. ***Zelotetraploa aquatica*** (holotype, HUEFS 216680): J. Conidiophore, conidiogenous cell, and conidium. Scale bars: A–I = 10 µm; J = 5 µm.

Colonies on the natural substrate effuse, granulose to farinose brown. Mycelium superficial and immersed. Hyphae septate, branched, smooth, hyaline, or subhyaline, 2–3 µm diam. Conidiophores micronematous, mononematous, globose, sometimes short moniliform, mostly reduced to conidiogenous cells. Conidiogenous cells globose or subglobose, sometimes ellipsoidal, monoblastic, determinate, smooth, brown, 4–6 µm wide. Conidial secession schizolytic. Conidia solitary, rectangular to oblong, euseptate, 14–24 cells, 13–23 × 8–10 µm, composed 4 parallel, tightly packed rows of cells

that develop independently, rows 10–23 × 4–5 µm, 2–6-septate, brown to dark brown, smooth.

Blastoheterospora J.S. Monteiro, Gusmão & R.F. Castañeda, **gen. nov.**

MycoBank MB 822124

Differs from all blastocatenate hyphomycetes by its polymorphic and variegated conidia.

Type species: *Blastoheterospora catenata* J.S. Monteiro et al.

Etymology: Latin, *blasto-*, referring to the conidial ontogeny mode, + Greek, *-hetero-*, meaning different, + Greek, *-spora*, referring to the conidia.

Colonies on the natural substrate effuse. Conidiophores micronematous or macronematous, mononematous, septate, hyaline or pale pigmented, randomly arising from cells of the conidial rows of *Zelotetraploa aquatica*. Conidiogenous cells monoblastic, terminal, determinate hyaline or pale or pigmented. Conidia blastocatenate, polymorphic (spherical, globose, clavate, pyriform, ellipsoidal, obovoid, oblong, cruciate, turbinate, flower-shaped, subchiroid to palmate) unicellular or phragmo- or dictyoseptate, euseptate, hyaline or pale pigmented. Synanamorph *Conioscyphopsis*-like, formed rarely from the tetracellular or dictyoseptate conidia.

Blastoheterospora catenata J.S. Monteiro, Gusmão & R.F. Castañeda, **sp. nov.**

Figs 1–4

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Differs from all described blastocatenate hyphomycetes by its polymorphic and variegated, unicellular, phragmoseptate, dictyoseptate, or subchiroid, blastocatenate conidia from monoblastic conidiogenous cells on secondary conidiophores that originate randomly from the conidial rows of cells of *Zelotetraploa aquatica*.

Type: Brazil, Bahia: Piatã, Rio Patricio, 13°09′S 41°46′W, on submerged decaying wood in a river, 10 January 2016, coll. M.C.O. Amorim (**Holotype**, HUEFS 216679).

Etymology: Latin, *catenata,* referring to the branched conidial chains.

Colonies on the natural substrate effuse, hyaline to subhyaline or gray. Conidiophores micronematous or macronematous, mononematous, septate, unbranched or slightly branched, 0–7-septate, with cells evidently attenuated at the septa, 5–70 × 1.5–2.5 µm, hyaline, subhyaline, gray to pale brown, smooth, randomly arising from cells of rows of *Zelotetraploa aquatica*. Conidiogenous cells monoblastic, sometimes polyblastic, terminal, integrated, determinate, sub-cylindrical, ellipsoidal, globose, subspathulate, clavate, lecythiform, 3.5–6 × 1.5–2.5 µm, hyaline, subhyaline pale brown to brown, smooth. Conidial secession schizolytic. Conidia blastocatenate, smooth; some are unicellular, hyaline, subhyaline or

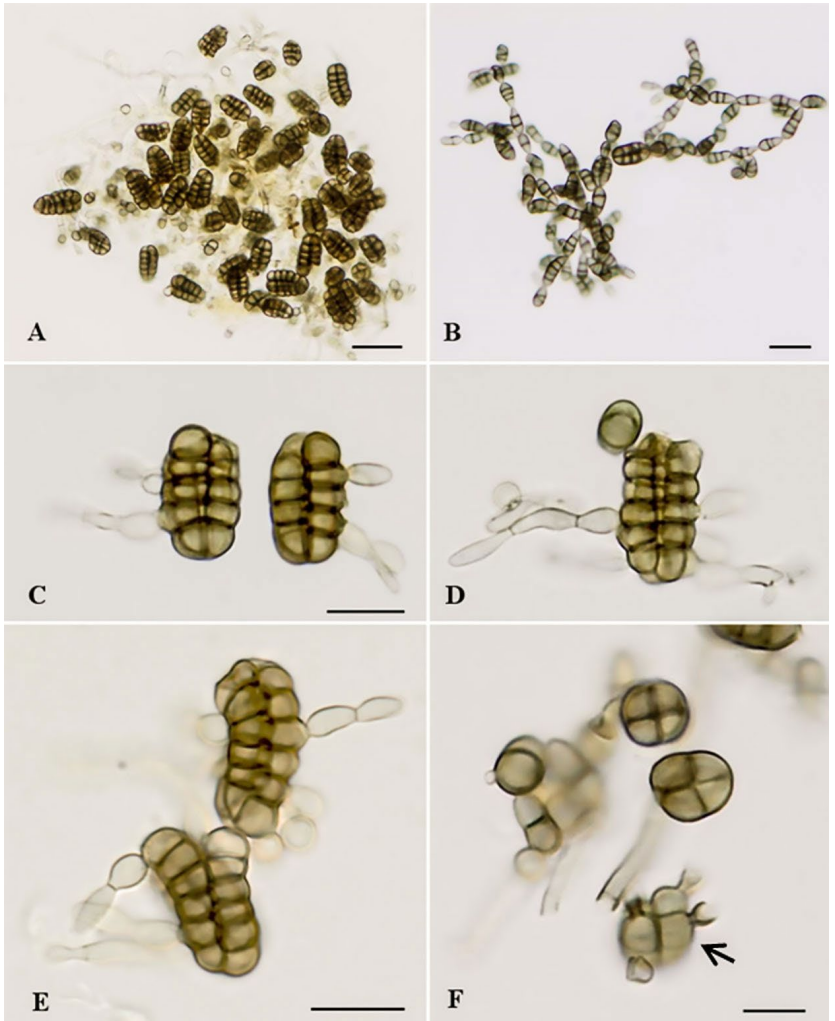

Fig. 2. ***Zelotetraploa aquatica*** (holotype, HUEFS 216680): A, B. Mixed colonies of *Z. aquatica* and *Blastoheterospora catenata*; C–E. Conidiophores and conidiogenous cells of *B. catenata* arising from conidia of *Z. aquatica*. ***Blastoheterospora catenata*** (holotype, HUEFS 216679): F. Conidia and conidiogenous cells of *Conioscyphopsis*-like synanamorph (arrow). Scale bars: A, B= 20 μm; C–F = 10 μm.

gray, spherical 3–4 μm diam. or subglobose 3–4 × 3–3.5 μm; others are phragmoconidia, dirty gray or pale brownish-gray at the apical cell and gray toward the base or concolor dirty gray, always brown at septa,

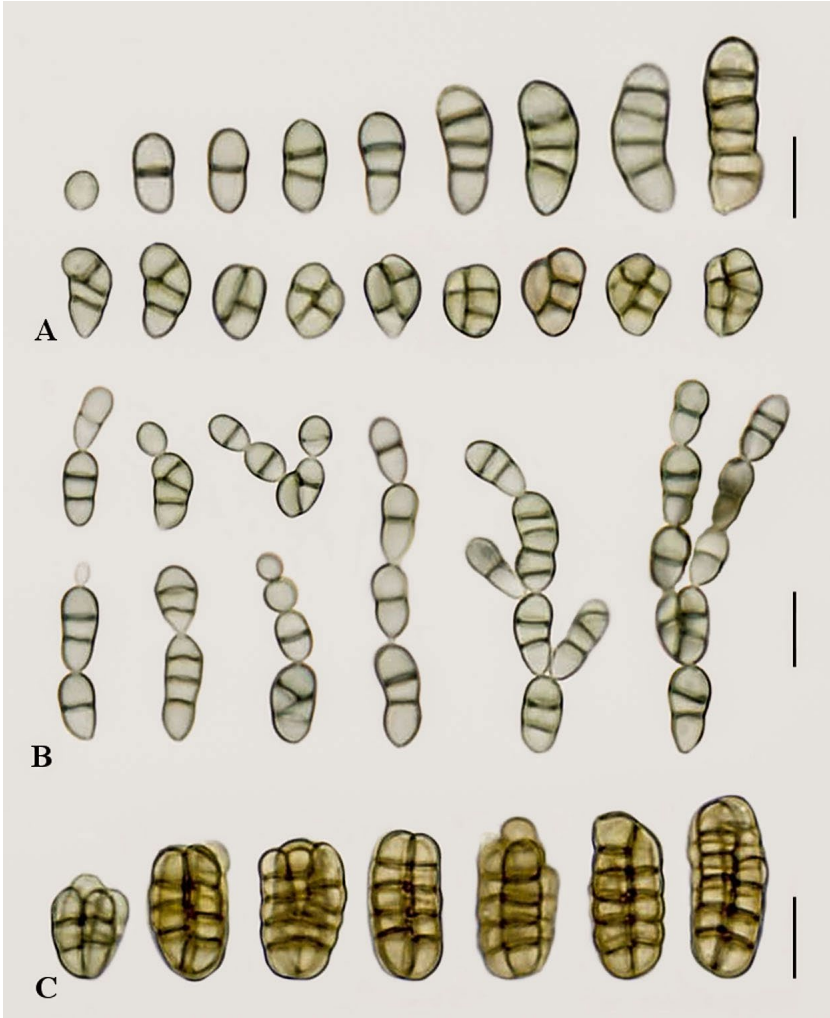

Fig.3. ***Blastoheterospora catenata*** (holotype, HUEFS 216679): A, B. Conidia. ***Zelotetraploa aquatica*** (holotype, HUEFS 216680): C. Conidia. Scale bars: 10 µm.

1–5-euseptate, clavate, pyriform, ellipsoidal, obovoid, oblong, straight or slightly curved, 5.5–16 × 3–4 µm; and others are euseptate, tri- or tetracellular dictyoseptate, cruciate, turbinate, flower-shaped, subchiroid to palmate, very pale brown, brownish-dirty gray, brown or dark gray-brown, darker at the septa, 5–14(–17) × 5–8 µm. Synanamorph *Conioscyphopsis-*

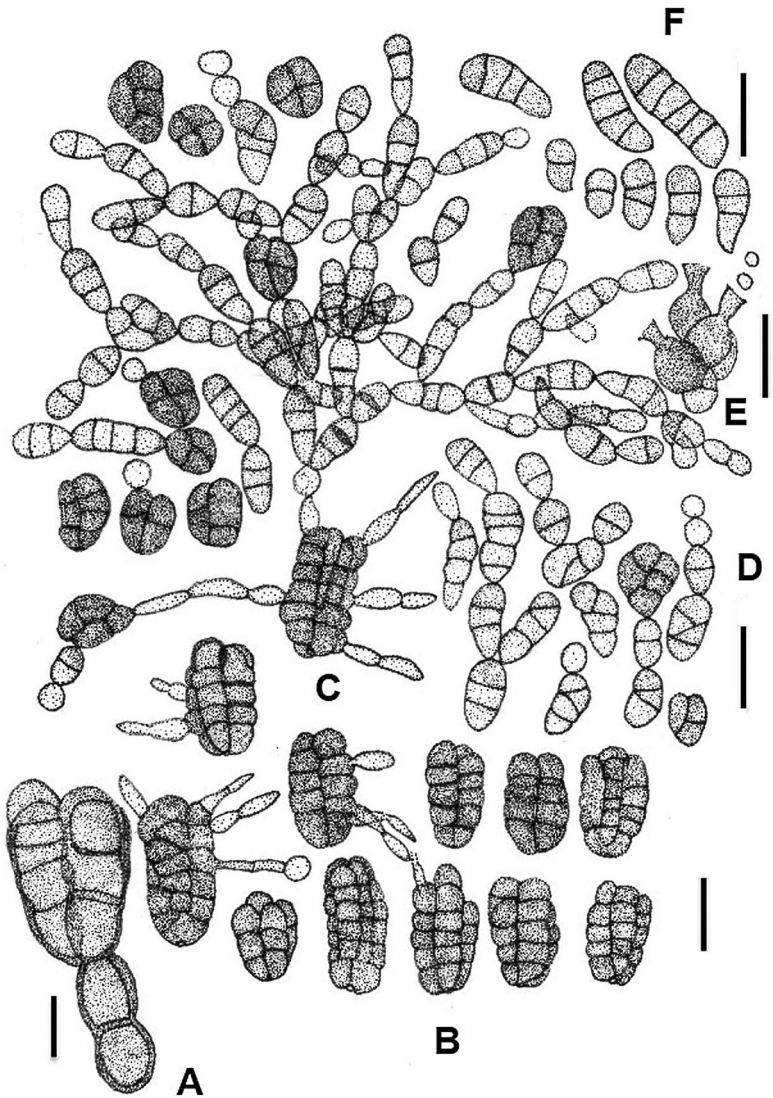

Fig.4. ***Zelotetraploa aquatica*** (holotype, HUEFS 216680): A. Conidiophore, conidiogenous cell, and conidium; B. Conidia without and with conidiophores and conidiogenous cells of *B. catenata*; C. Conidium with extending conidiophores, conidiogenous cells, and conidia of *B. catenata*. ***Blastoheterospora catenata*** (holotype, HUEFS 216679): D, F. Conidia; E. Conidiogenous cells and conidia of *Conioscyphopsis*-like synanamorph. Scale bars: A = 5 μm; B–F = 10 μm.

like conidiogenous cells monophialidic, lageniform to globose, 6–8 × 4–5 µm, with an evident infundibuliform collarette, 2.5–3.5 µm deep, globose, unicellular, pale brown or gray-brown, smooth conidia, 1.5–3 µm diam., poorly sporulated, formed rarely, from the cruciate, flower-shaped, tri- or tetracellular, dictyoseptate conidia.

Comments—The genera *Tetraploa* Berk. & Broome and *Pseudotetraploa* Kaz. Tanaka & K. Hiray. are somewhat similar to *Zelotetraploa*, but *Tetraploa* (typified by *T. aristata* Berk. & Broome) is distinguished by intercalary, cylindrical conidiogenous cells not differentiated from the assimilative hyphae, that produce muriform, euseptate conidia composed of (3–)4 rows of cells with a divergent, 2–3-septate apical appendage (Tanaka et al. 2009). The conidia of *Pseudotetraploa* (typified by *P. curviappendiculata* (Sat. Hatak. et al.) Kaz. Tanaka & K. Hiray. are muriform, distoseptate, and composed of 4–8 rows of cells with setose appendages at the apical part (Tanaka et al. 2009). *Paratetraploa* M.K.M. Wong & K.D. Hyde (typified by *P. exappendiculata* M.K.M. Wong et al.) is similar to *Zelotetraploa* in conidial morphology, but has cylindrical conidiogenous cells not differentiated from the assimilative hyphae that are punctate and smooth and lack synanamorph (Wong et al. 2002, Silva & Gusmão 2017). The presence of twelve conidial forms (determined by varied pigmentation and number of septa) in *Blastoheterospora catenata* is unique among hyphomycetes (Seifert et al. 2011). So far, this peculiarity does not allow comparing it with any other genus described that produce conidia in branched acropetal chains.

We speculate that *Blastoheterospora catenata* might be parasitic on *Zelotetraploa aquatica;* the relationship between these two species requires investigation.

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